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15 May 1969

Material Test Procedure 8-2-014
Deseret Test Center

U. S. ARMY TEST AND EVALUATION COMMAND
COMMODITY ENGINEERING TEST PROCEDURE

DISPENSING PUMPS, HAND DRIVEN,
LIQUID CHEMICAL AGENT

1. OBJECTIVE

The objective of this Materiel Test Procedure (MTP) is to establish uniform procedures for determining and evaluating the technical performance and safety aspects of liquid chemical agent hand-driven dispensing pumps in terms of the criteria established by applicable Qualitative Materiel Requirements (QMR), Small Development Requirements (SDR), Technical Characteristics (TC), and other design requirements and specifications.

2. BACKGROUND

The hand-driven dispensing pump is used for transferring liquid chemical agents from bulk containers into airplane smoke tanks or other dispensing devices in the field. It consists of two major components - a pump and a filling line. It is further equipped with means for preventing the escape of toxic fumes into the atmosphere.

3. REQUIRED EQUIPMENT

a. Environmental Chambers for:

- 1) Temperature/humidity testing
- 2) Fungus testing
- 3) Sunshine testing
- 4) Salt Fog testing
- 5) Dust testing

b. Suitable Site for Pumping Test Station

c. Photographic Equipment, Still and Motion Picture Camera and Film

d. Meteorological Equipment to measure and record:

- 1) Temperature
- 2) Wind direction and speed
- 3) Relative humidity

e. Protective clothing

f. Aircraft or Simulated Aircraft

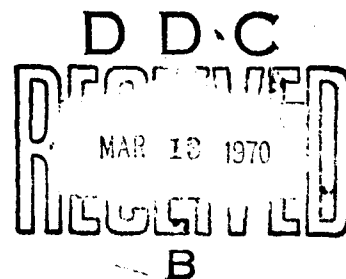
g. Accelerometers, as required

h. Transportability testing facility for:

- 1) Vibration
- 2) Shock

i. Materials Handling Equipment

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4. REFERENCES

- A. USATECOM Regulation 385-6, Verification of Safety of Materiel During Testing.
- B. USAMC Pamphlet 706-134, Engineering Design Handbook: Maintainability Guide for Design.
- C. MIL-STD-810B, Environmental Test Methods.
- D. MIL-STD-1472, Human Engineering Design Criteria for Military Systems, Equipment, and Facilities.
- E. MIL-H-46855, Human Engineering Requirements for Military Systems, Equipment, and Facilities.
- F. MTP 7-1-002, Air Portability and Airdrop Service Testing.
- G. MTP 7-2-509, Airdrop Capability of Materiel.
- H. MTP 7-2-515, Air Transport (Suitability of Equipment for).
- I. MTP 8-2-500, Receipt Inspection.
- J. MTP 8-2-503, Rough Handling and Surface Transport.
- K. MTP 8-2-510, Decontamination.
- L. MTP 8-2-512, Leak Testing of Agent-Filled Munitions and Containers.

5. SCOPE

5.1 SUMMARY

The procedure described in this MTP is divided into a series of subtests. The sequence may be modified by the test plan. The receipt inspection subtest must be performed first to ascertain the condition of test items as received from their manufacturers; the safety tests should be performed next to reveal any unforeseen hazards; and the outdoor performance tests should be performed last. In preparing the test plan, consideration should be given to the number of test items available, their susceptibility to damage, time available, availability of facilities, reliability and confidence limits set by QMR and SDR, and budget limitations. Subtests deemed most likely to cause failure should be performed first so that the developing agency may have the earliest possible notice of the deficiency.

The following subtests comprise the complete procedure:

- a. Receipt Inspection - An inspection of the test item as received to (1) determine its physical characteristics and conditions, (2) locate defects it might have, and (3) identify damage received during transport. During this inspection the test items will also be serially numbered for subsequent identification.
- b. Safety Evaluation - The objective of this procedure is to check the safety statement issued by the developing agency and to identify the safety hazards, if any, which must be included in the safety release recommendation required by USATECOM Regulation 385-6.
- c. Simulated Environmental Testing - An evaluation to determine the effects of cyclic storage, extreme temperatures, fungus, humidity, dust, sunshine, and fresh and salt water on the test item.
- d. Rough Handling and Surface Transport tests - An evaluation to

determine the effects of rough handling and surface transport on the physical and operational characteristics of the test item.

e. Air Transportability - An evaluation to determine the effects of air transport conditions on the physical and operational characteristics of the test item.

f. Air Drop Capability - An evaluation to determine the effects on the test item resulting from its being subjected to airdrop conditions.

g. Leak Testing - An evaluation to determine if the test item leaks when subjected to standard leak tests and conditions.

h. Operational Reliability - An evaluation to determine if the test item meets specified reliability criteria.

i. Decontamination Aspects - An evaluation to determine the ease with which the test item can be decontaminated and the effects of the process on the item.

j. Maintenance Aspects - An evaluation to determine the ease of performing the required maintenance on the test item and the need for special tools and skills.

k. Human Factors Aspects - An evaluation to assess the ease of transporting, installing, and operating the test item.

l. Agent-Hardware Compatibility - An evaluation to determine if the test item and the chemical agent it dispenses adversely affect each other.

5.2 LIMITATIONS

None.

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Prescheduling Conditions

a. Decontamination equipment must be available at a suitable test site.

b. Meteorological forecast must be available before the conduct of each outdoor subtest to prevent wasted effort in unsuitable weather.

6.1.2 Safety Statement

The test officer will insure that a safety statement has been received from the developing agency before commencing testing and that it is understood by all test personnel. The safety statement includes information pertaining to the test item's operational limitations and specifies hazards peculiar to the item or components to be tested.

6.1.3 Safety Procedures

a. Test plans and procedures will insure performance in the safest manner consistent with accomplishing the mission. Plans will include safety procedures, precautions, protections, and emergency procedures as necessary. Technical information on the hazards and safety characteristics of the test

item as provided by the safety statement and other pertinent information will be included. Such information will include an evaluation of potential hazards, analysis of risks, limitations, and precautions, including special test equipment and techniques that should be incorporated in test plans and procedures.

b. One specific individual will be charged with responsibility for safety. He will be familiar with the construction and operation of the test item and its critical components, will have full knowledge of the hazards and safety aspects of the test, will review test procedures for evaluation of hazards, and will recommend control measures.

c. All personnel who participate in or observe the tests will be briefed on the proper test methods and procedures.

d. When dealing with chemical agents, all test personnel must constantly consider not only the hazards that may be encountered during normal conditions, but also those which could be encountered under the worst conditions of malfunctioning, accidents, or emergencies.

e. Test personnel must be available to recognize symptoms of chemical agent poisoning in themselves and others and to use first aid and decontaminating procedures.

f. A record will be kept of any injuries suffered by test personnel during testing, regardless of how minor they may be and regardless of their relevance to testing.

6.1.4 Logistical Requirements

Prior to the conduct of any subtest, the test officer will insure that all logistical requirements are satisfied.

6.2 TEST CONDUCT

6.2.1 Receipt Inspection

Subject the test item to the applicable procedures of MTP 8-2-500 following its arrival at the test site, with emphasis on the following:

a. Visually inspect the test item package and record the following:

- 1) Binding deficiencies such as broken straps, seals, etc
- 2) Packaging material deficiencies such as cuts, tears, breaks, etc
- 3) Rust and corrosion of metal
- 4) Illegible or missing markings
- 5) Deterioration of fiber cylinders, tape, etc

b. Visually inspect the test item for damage such as corrosion, dents, cracks, illegible markings, etc and subject damaged items to the leak test procedures of paragraph 6.2.7.

c. Determine and record the following:

- 1) Length, width, height and weight of the packaged test item.
- 2) Length, maximum height and diameter, and weight of the test item.
- 3) Presence of protective material.

- d. Number serially each test item for future identification.
- e. Photograph the defective test items.

6.2.2 Safety Evaluation

a. Observe the installation and operation of the equipment in accordance with existing instruction, instruction manuals, directives, safety SOP's, and similar guidance. Record hazardous conditions such as jagged edges, under-strength lifting apparatus, etc.

b. Collect data for inclusion in the safety release required by USATECOM Regulation 385-6.

c. Perform additional checks as required to verify all the safety aspects included in the safety statement prepared by the developing agency. Record deficiencies and recommended inclusions.

6.2.3 Simulated Environmental Testing

6.2.3.1 Cyclic Storage

a. Subject the test item in its packing container to cycles of climatic extremes. A cycle shall consist of three weeks duration as follows: successive one-week tests at humid, low temperature, and high temperature. Chamber conditions for each climatic condition are as follows:

- 1) Humid Storage. The chamber shall be maintained at $113^{\circ}\text{F} \pm 2^{\circ}\text{F}$ and 85% R.H. for the duration of the test.
- 2) Low Temperature Storage. The chamber shall be maintained at $-65^{\circ}\text{F} \pm 2^{\circ}\text{F}$ for the duration of the test.
- 3) High Temperature Storage. The chamber shall be maintained at $160^{\circ}\text{F} \pm 2^{\circ}\text{F}$ for the duration of the test.

b. The test item shall be subjected to a minimum of three such cycles, or more if specified. Upon completion of each cycle, the container and contents shall be examined for damage.

6.2.3.2 Extreme-Temperature Tests

Unless otherwise directed the test item will be subjected to the following temperature tests:

6.2.3.2.1 Low-Temperature Tests - Place a minimum of three test items in a test chamber, and perform the following:

a. Reduce the chamber temperature to -53.9°C (-65°F), maintain it at -53.9°C for a period of 72 hours, and visually inspect the test items and record any damage.

b. Adjust the chamber temperature to the test item's minimum operating temperature as established by design requirements, and maintain this temperature until stabilization is reached. If stabilization is attained in less than 24 hours, maintain temperature for a complete 24-hour interval. Perform the following:

NOTE: Stabilization, unless otherwise specified, is considered to be reached when the temperature of the test item does not change more than 2°C (3.6°F) per hour.

- 1) Visually inspect the test items, and record damage.
- 2) Remove 1/3 of the test items, and verify operability as described in paragraph 6.2.8.

NOTE: Operability checks should be accomplished within 15 minutes of removing the test items from the chamber.

c. Remove the items from the chamber, allow their temperature to stabilize at local ambient conditions, and perform the following:

- 1) Visually inspect the test items, and record damage.
- 2) Subject 1/3 of the test items to the leak test procedures of paragraph 6.2.7.
- 3) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.8.

6.2.3.2.2 High-Temperature Tests - Place a minimum of four test items in a temperature chamber, and perform the following:

a. Adjust the temperature of the chamber to 68.3°C (155°F) and a relative humidity of 15 percent, and maintain these conditions for a minimum of 4 hours, then visually inspect the test item and record any damage.

b. Adjust the chamber to a temperature of 48.9°C (120°F) and a relative humidity of no more than 15 percent and maintain these conditions for a minimum of 24 hours. Then perform the following:

- 1) Visually inspect the test items, and record damage.
- 2) Remove 1/3 of the test items, and perform the following:
 - a) Subject 1/3 of this group of test items to the leak test procedures of paragraph 6.2.7.
 - b) Verify the operability of the test item by subjecting the remainder of this group to the procedures of paragraph 6.2.8.

c. Remove all of the remaining test items from the chamber, subject them to local ambient temperatures and humidity for 24 hours, and perform the following:

- 1) Visually inspect the test items, and record damage.
- 2) Subject 1/3 of these test items to the leak test procedures of paragraph 6.2.7.
- 3) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.8.

6.2.3.3 Fungus Test

- a. Subject a minimum of 2 test items to the fungus test of Procedure I, Method 508, reference 4C (MIL-STD-810B).
- b. At the completion of the cycling period, perform the following:
 - 1) Visually inspect the items, and record signs of corrosion.
 - 2) Disassemble $\frac{1}{2}$ of test items, and inspect the components for the presence of fungus.
 - 3) Verify the operability of the items by subjecting the remaining test items to the procedures of paragraph 6.2.8.

6.2.3.4 Humidity Test

- a. Subject a minimum of 2 test items to the humidity cycling of Procedure I, Method 507, reference 4C (MIL-STD-810B).
- b. At the completion of the cycling period, perform the following:
 - 1) Visually inspect the items, and record signs of corrosion.
 - 2) Disassemble $\frac{1}{2}$ of the test items, and inspect the components for corrosion and deterioration.
 - 3) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.8.

6.2.3.5 Dust Test

- a. Subject a minimum of 2 test items to the exposure conditions of Procedure I Method 510, reference 4C (MIL-STD-810B).
- b. At the completion of the exposure period, perform the following:
 - 1) Visually inspect the test items, and record surface damage noted.
 - 2) Disassemble $\frac{1}{2}$ of the test items, and inspect the components for damage and presence of dust.
 - 3) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.8.

6.2.3.6 Sunshine Test

- a. Subject a minimum of 2 test items to the sunshine conditions of Procedure I, Method 505, reference 4C (MIL-STD-810B).
- b. At the completion of the exposure period, perform the following:
 - 1) Visually inspect the test items, and record surface damage, such as deterioration of natural rubber and plastics.
 - 2) Subject $\frac{1}{2}$ of the test items to the leak test of paragraph 6.2.7.
 - 3) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.8.

6.2.3.7 Water Immersion Tests

- a. Subject a suitably determined number of packaged test items to the

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water immersion test of Procedure I, Method 512, reference 4C (MIL-STD-810B).

NOTE: If design requirements establish depth of water, water temperature, or time of immersion different from the standard procedure, the test plan will so state.

b. At the completion of the immersion test, remove the test items from their containers, and perform the following:

- 1) Inspect the test items' components for evidence of water.
- 2) Subject the test items to the operability test of paragraph 6.2.8.

6.2.3.8 Salt Fog Test

a. Subject a minimum of 3 test items to the conditions of Procedure I, Method 509, reference 4C (MIL-STD-810B).

b. At the completion of the salt fog spray exposure, perform the following:

- 1) Rinse the test items with clear water.
- 2) Visually inspect the test items for the presence of corrosion.
- 3) Disassemble 1/3 of the test items, and inspect their components for evidence of water penetration and corrosion.
- 4) Subject 1/3 of the test items to the leakage test of paragraph 6.2.7.
- 5) Verify the operability of the test items by subjecting the remaining test item(s) to the procedures of paragraph 6.2.8.

6.2.3.9 Rain Test

a. Subject a minimum of 2 test items to the rain conditions of Procedure I, Method 506, reference 4C (MIL-STD-810B).

b. At the completion of the rain exposure, perform the following:

- 1) Visually inspect the test items for the presence of corrosion.
- 2) Disassemble $\frac{1}{2}$ of the test items, and inspect the components for evidence of water penetration and corrosion.
- 3) Verify the operability of the test item by subjecting the remaining items to the procedures of paragraph 6.2.8.

6.2.4 Rough Handling and Surface Transport Tests

a. Subject the test item packaged in its original container to the following procedures of MTP 8-2-503.

- 1) The vibration test of paragraph 6.2.2.2a.3)
- 2) The shock test of paragraph 6.2.2.1a.2)

b. At the completion of testing, perform the following:

- 1) Visually examine the test item's packaging for cracks, breaks, undone bindings, etc.
- 2) Visually examine the test item for damage and deformation.
- 3) Subject the test item to the leak test of paragraph 6.2.7.
- 4) Verify the operability of the test item by subjecting it to the procedures of paragraph 6.2.8.

6.2.5 Air Transportability

Determine the ease of loading and unloading aircraft as described in the applicable sections of MTP 7-2-515 or as follows:

NOTE: Background information on air transportability is contained in MTP 7-1-002.

a. Load the test item in its shipping container (crate/package) aboard aircraft or simulated aircraft facilities as indicated in the test plan loading schedule using normal loading equipment and record the following:

- 1) Type of aircraft used or simulated.
- 2) Shipping container length, width, height, weight, and material.
- 3) Equipment used for loading.
- 4) Difficulties encountered while loading.
- 5) Method of tiedown.
- 6) Damage sustained by the shipping container during the loading operation.

b. Unload the test item from the aircraft or simulated aircraft and record the following:

- 1) Equipment used in unloading
- 2) Difficulties encountered while unloading
- 3) Damage sustained by the shipping container during unloading

6.2.6 Airdrop Capability

Subject a minimum of 2 test items, packaged in their original containers, to the applicable procedures of MTP 7-2-509 and the following:

a. Rig the test containers, with accelerometers attached, in appropriate airdrop containers, and drop the containers from typical combat-support cargo aircraft flying at the altitude and speed stipulated in the test plan. Record the following:

- 1) Aircraft type(s) used
- 2) Aircraft airspeed
- 3) Altitude
- 4) Air conditions
- 5) Meteorological conditions
- 6) Impact velocities
- 7) Deceleration magnitude at impact in g's.

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- b. Cover the airdrop test procedures with still and motion cameras.
- c. At completion of the test, perform the following:

- 1) Visually examine the test item's packaging for breaks, undone bindings, etc.
- 2) Visually examine the test items for damage and deformation.
- 3) Subject $\frac{1}{2}$ of the test items to the leakage test of paragraph 6.2.7.
- 4) Verify the operability of the test items by subjecting the remaining test items to the procedures of paragraph 6.2.8.

6.2.7 Leak Testing

a. Determine if the test item and required accessories such as valves and couplings leak as described in the applicable sections of MTP 8-2-512, at the completion of the following subtests:

- 1) Receipt inspection (paragraph 6.2.1)
- 2) Extreme-temperature tests (paragraph 6.2.3.1)
- 3) Sunshine test (paragraph 6.2.3.5)
- 4) Salt fog test (paragraph 6.2.3.7)
- 5) Rough handling and surface transport tests (paragraph 6.2.4)
- 6) Airdrop capability test (paragraph 6.2.6)

b. When repairs are performed to prevent leakage, retest the test item and note effectiveness of the repairs.

6.2.8 Operational Reliability

NOTE: 1. Reliability testing shall be performed under the conditions prescribed in the test criteria and other applicable instructions, based upon the requirements contained in the applicable QMR or SDR and TC's.

2. The test items undergoing operational reliability testing shall have previously been subjected to the following test procedures:

- a) Simulated environmental testing (paragraph 6.2.3).
- b) Rough Handling and Surface Transport test (paragraph 6.2.4)
- c) Airdrop capability test (paragraph 6.2.6)
- d) Decontamination aspects (paragraph 6.2.9)

a. Select a suitable test site. The test site shall meet all safety requirements and be of sufficient area to ensure that the agent is confined to the test site. Record the following:

- 1) Soil type under and around the transfer station.
- 2) Dispensing pump design features which prevent overflow and spillage.
- 3) Nomenclature and description of each tank filled.
- 4) Chemical agent utilized in test.

- 5) Meteorological data.
- 6) For the chemical agent container:
 - a) Description
 - b) Nomenclature
 - c) Method of installation
 - d) Time required to set up

b. Connect the dispensing pump to the container and record the following:

- 1) Time required to assemble
- 2) Number of personnel required
- 3) Protective clothing worn
- 4) Preliminary preparation of couplings
- 5) Difficulties encountered
- 6) Tools required

c. Operate the pump according to the applicable instructions and record the following:

- 1) Number of personnel required
- 2) For each operator:
 - a) Head of liquid against which pump works, in inches.
 - b) Rate of pump operation, in strikes or revolutions per minute.
 - c) Discharge rate of pump.
 - d) Evidence of spillage or leakage.
- 3) Lubrication required
- 4) Adjustments required
- 5) Difficulties encountered
- 6) Fill cycle time for each field dispersal device filled.

d. Evidence of vaporized agent external to pump.

e. Disconnect and remove the pump and record the following:

- 1) Time required
- 2) Number of personnel required
- 3) Tools required
- 4) Difficulties encountered
- 5) Evidence of leakage or spillage

6.2.9 Decontamination Aspects

a. Decontaminate the test item as described by the applicable sections of MTP 8-2-510.

NOTE: The test item shall be decontaminated in accordance with applicable criteria.

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b. Verify the operability of test item after decontamination as described in the procedures of paragraph 6.2.8.

6.2.10 Maintenance Characteristics

NOTE: Background information on checking a test item to determine its maintenance aspects as contained in reference 4B (USAMC Pamphlet 706-134).

a. Complete authorized maintenance tasks in accordance with the test item. Maintenance manuals, instructions, etc.

b. Perform all required unscheduled maintenance tasks throughout the period of testing.

c. Determine the accuracy and evaluate of the test item maintenance package.

d. Record the following for all maintenance performed:

1) Time required to perform:

- a) Scheduled maintenance
- b) Unscheduled maintenance

2) Personnel required to perform:

- a) Scheduled maintenance
- b) Unscheduled maintenance

3) Cumulative test item down time

4) Time taken between repairs, and reasons, if any

5) Frequency of repairs

6) Nomenclature of parts used

7) Special tools or skills required

e. Photograph parts requiring repair or replacement.

6.2.11 Human Factors

Observe the human factor aspects of the test item throughout the conduct of all subtests required by the test plan. Specific aspects to be observed and recorded will include the following:

NOTE: References 4J (MIL-STD-1472) and 4K (MIL-H-46855) contain discussions of the human factors relevant to the items under test.

a. Compatibility with field clothing and equipment, particularly with protective clothing, arctic clothing, etc.

b. Simplicity and adequacy of operating instructions.

c. Conformance of the test item's design to qualitative requirements, particularly whether it is as compact and light as possible commensurate with functional characteristics.

d. Ease of identifying items and components under daylight, darkness, and blackout conditions.

e. Needs for special tools or special handling.

6.2.12 Agent-Hardware Compatibility

a. Inspect the inner surface of the dispensing pump for evidence of corrosion, pitting, or other harmful effect of the chemical agent. Record any such evidences.

b. Using photomicrographic techniques, compare the inner surfaces of a used dispensing pump with the same surfaces of a pump which has not been used. Record any differences.

c. Analyze the chemical agent and determine if there are any adverse affects due to the container composition.

6.3 TEST DATA

6.3.1 Receipt Inspection

a. Record the data collected as described in applicable sections of MTP 8-2-500 and the following:

1) For the test item package:

- a) Binding of packing material deficiencies.
- b) Indications of damage, deterioration, or illegible markings.
- c) Length, width, height, in feet and inches.
- d) Evidence of rust or corrosion.
- e) Deterioration of fiber cylinders.
- f) Weight, in pounds.

2) For the test item:

- a) Evidence of damage or deterioration
- b) Leakage data collected as described in paragraph 6.2.7
- c) Length, maximum height and diameter, in feet and inches
- d) Weight, in pounds
- e) Presence of protective materials

b. Retain all photographs

6.3.2 Safety Evaluation

Record the following:

- a. Any hazardous characteristics
- b. Test item deficiencies and recommendations for improvement
- c. Information for inclusion in the Safety Release Recommendation

6.3.3 Simulated Environmental Testing

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6.3.3.1 Cyclic Storage

Record the following for each cycle:

- a. Test item identification number
- b. Cycle number
- c. Damage to:
 - 1) Container
 - 2) Test item

6.3.3.2 Extreme Temperature Tests

6.3.3.2.1 Low Temperature Tests -

Record the following for each test item, as applicable:

- a. Test item identification number
- b. For temperature of -53.9°C (-65°F); damage incurred
- c. For minimum operating temperature:
 - 1) Temperature in °C and °F.
 - 2) Damage incurred
 - 3) Operability data collected as described in paragraph 6.2.8
- d. For ambient temperature:
 - 1) Temperature in °C and °F
 - 2) Test item damage
 - 3) Leakage data collected as described in paragraph 6.2.7
 - 4) Operability data collected as described in paragraph 6.2.8.

6.3.3.2.2 High Temperature -

Record the following for each test item, as applicable:

- a. Test item identification number
- b. For temperature of 68.3°C (155°F) damage incurred
- c. For temperature of 48.9°C (120°F):
 - 1) Damage incurred
 - 2) Leakage data collected as described in paragraph 6.2.7
 - 3) Operability data collected as described in paragraph 6.2.8
- d. For ambient temperature:
 - 1) Temperature in °C and °F
 - 2) Relative humidity in %
 - 3) Damage incurred
 - 4) Leakage data collected as described in paragraph 6.2.7
 - 5) Operability data collected as described in paragraph 6.2.8

6.3.3.3 Fungus Test

Record the following for each test item:

- a. Test item identification number
- b. Operability data collected as described in paragraph 6.2.8
- c. Presence of fungus on test item and components
- d. Evidence of corrosion

6.3.3.4 Humidity Test

Record the following for each test item:

- a. Test item identification number
- b. Operability data collected as described in paragraph 6.2.8
- c. Evidence of corrosion on test item and components

6.3.3.5 Dust Test

Record the following for each test item:

- a. Test item identification number
- b. Operability data collected as described in paragraph 6.2.8
- c. Damage to:
 - 1) External surfaces
 - 2) Test item components
- d. Presence of dust on test item components

6.3.3.6 Sunshine Test

Record the following for each test item:

- a. Test item identification number
- b. Surface damage
- c. Leakage data collected as described in paragraph 6.2.7
- d. Operability data collected as described in paragraph 6.2.8

6.3.3.7 Water Immersion Test

Record the following for each test item as applicable:

- a. Test item identification number
- b. During immersion:
 - 1) Presence of bubbling, if any
 - 2) Immersion time to bubbling, if any, in minutes
- c. Presence of water penetration
- d. Operability data collected as described in paragraph 6.2.8

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6.3.3.8 Salt Fog Test

Record the following for each test item as applicable:

- a. Test item identification number
- b. Operability data collected as described in paragraph 6.2.8
- c. Evidence of corrosion on test item and components
- d. Evidence of water penetration
- e. Leakage data collected as described in paragraph 6.2.7

6.3.3.9 Rain Test

Record the following for each test item, as applicable:

- a. Test item identification number
- b. Presence or corrosion:
 - 1) Test item
 - 2) Test item components
- c. Evidence of water penetration

6.3.4 Rough Handling and Surface Transport Tests

Record the following for each test item, as applicable:

- a. Test item identification number.
- b. Data collected as described in the applicable sections of MTP
- c. Leakage data collected as described in paragraph 6.2.7
- d. Operability data collected as described in paragraph 6.2.8

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6.3.5 Air Transportability

Record the following:

- a. Data collected as described in the applicable sections of MTP
- b. Type of aircraft used or simulated.
- c. Shipping container:
 - 1) Length, width and height, in inches
 - 2) Weight, in pounds
 - 3) Material
- d. Equipment used in loading.
- e. Difficulties encountered while loading.
- f. Method of tiedown.
- g. Damage incurred to the package while loading.
- h. Equipment used in unloading.
- i. Difficulties incurred in unloading.

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j. Damage incurred to the package while unloading.

6.3.6 Air Drop Capability

a. Record the following for each test item:

- 1) Test item identification
- 2) Type aircraft used
- 3) Aircraft altitude in feet
- 4) Aircraft airspeed in mph
- 5) Air conditions (calm, turbulent)
- 6) For meteorological conditions:
 - a) Temperature in °C
 - b) Wind speed in mph
 - c) Wind direction
 - d) Relative humidity in percent
 - e) Barometric pressure
- 7) Deceleration magnitude at impact in g's
- 8) Impact velocity in fps
- 9) For test item package:
 - a) Presence of cracks, breaks, etc.
 - b) Undone binding
- 10) For air test item:
 - a) Damage or deformities
 - b) Leakage data collected as described in paragraph 6.2.7
 - c) Operability data collected as described in paragraph 6.2.8

b. Retain all motion and still pictures

6.3.7 Leak Testing

- MTP 8-2-512.
- a. Record data collected as described in the applicable sections of
 - b. Effectiveness of repairs, when applicable.

6.3.8 Operational Reliability

Record the following:

- a. Soil type around transfer station
- b. Dispensing pump features tending to prevent overflow and spillage
- c. Nomenclature of tank filled
- d. Chemical agent used in test
- e. Meteorological data
- f. For each chemical agent container:

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- 1) Description
- 2) Nomenclature
- 3) Method of installation
- 4) Time required to set up

g. For the pump installation:

- 1) Time required to assemble
- 2) Number of personnel required
- 3) Protective clothing worn
- 4) Preliminary preparation of couplings
- 5) Difficulties encountered
- 6) Tools required

h. For pump operation:

- 1) Number of personnel required
- 2) Lubrication required
- 3) Adjustments required
- 4) Fill cycle time for each field dispersal device filled

i. For each pump operator:

- 1) Head of liquid against which pump works, in inches
- 2) Rate of pump operation, in strokes or revolutions per minute
- 3) Discharge rate of pump, in gallons per minute
- 4) Evidence of spillage or leakage

j. For disconnecting pump:

- 1) Time required
- 2) Number of personnel required
- 3) Tools required
- 4) Difficulties encountered
- 5) Evidence of leakage or spillage

k. Evidence of vaporized agent external to pump

6.3.9 Decontamination Aspects

Record the following for each test item undergoing decontamination:

- a. Data collected as described in the applicable sections of MTP 8-2-510.
- b. Operability data collected as described in the applicable procedures of paragraph 6.2.9.

6.3.10 Maintenance Characteristics

a. Record the following:

- 1) Adequacy and accuracy of maintenance package

- 2) Time required to perform, in minutes:
 - a) Scheduled maintenance
 - b) Unscheduled maintenance
- 3) Personnel required to perform:
 - a) Scheduled maintenance
 - b) Unscheduled maintenance
- 4) Cumulative down time in hours
- 5) Time taken between repairs in hours, if any
- 6) Reason for delay in repairs, if any
- 7) Frequency of repairs
- 8) Nomenclature of parts used
- 9) Special tools required
- 10) Special skills required

b. Retain all photographs

6.3.11 Human Factors

Record the following:

- a. Compatibility with field clothing and equipment.
- b. Adequacy of operating instructions.
- v. Conformance to qualitative requirements.
- d. Ease of identifying items and components under daylight, darkness, and blackout conditions.
- e. Special tools required.
- f. Special handling required.

6.3.12 Agent-Hardware Compatibility

Record the following:

- a. Presence of the following on the test item:
 - 1) Corrosion
 - 2) Pitting
 - 3) Rust
 - 4) Peeling paint
 - 5) Adverse effect on agent
- b. Retain all photographs for the test file
- c. Retain all laboratory analysis for the test file

6.4 DATA REDUCTION AND PRESENTATION

6.4.1 Receipt Inspection

- a. Data collected as a result of this procedure shall be presented as indicated in the applicable portions of MTP 8-2-500.
- b. The description of the test item, number of items tested, and conditions upon receipt shall be presented in tabular form.
- c. Results of the leak subtest shall be presented in narrative or other convenient form.
- d. Photographs shall be used to substantiate results.

6.4.2 Safety Evaluation

- a. A Safety Release Recommendation (USATECOM Regulation 385-6) shall be forwarded to the U. S. Army Test and Evaluation Command within 30 days of the beginning of the test. The Safety Release Recommendation shall contain the following information: special safety considerations or hazards to personnel and materiel (including developmental types of equipment as well as standard components used in assemblage of items being tested).
- b. Data and comments relative to the safety hazards observed during any phase of testing.
- c. Comments relative to suggested safety improvements.

6.4.3 Simulated Environmental Testing

- a. The results of the subtests conducted shall be presented in tabular or other suitable form.
- b. The results of the operational check tests performed at the conclusion of the various environmental tests shall be presented in narrative or other suitable form.

6.4.4 Rough Handling and Surface Transport

- a. Rough handling and surface transport data shall be presented as prescribed in MTP 8-2-503.
- b. Vibration and shock data shall be presented in tabular form to indicate test times, distances (dropped), shock levels, vibration frequencies, etc., and significant findings of the test. Include photographs of damage.
- c. Present data on operation of test item after subjection to rough handling and surface transport, conditions, vibration and shock.

6.4.5 Air Transportability

- a. Data shall be presented in summary form as indicated in the applicable sections of MTP 7-2-515, and other pertinent testing documentation.
- b. Present data regarding any significant aspects of the test item observed during conduct of air transport testing.

6.4.6 Air Drop Capability

- a. The results of the subtest shall be presented as prescribed in MTP 7-2-509, and include the following:

- 1) Type of aircraft

- 2) Air speed, altitude, and meteorological conditions
- 3) Packaging material condition after test
- 4) Maximum "G" force on opening of parachute and on impact

b. Present narrative comments and data regarding ease or difficulty encountered in accomplishing air drop. Present photographs (as required) to indicate results of air drop.

c. Present data on operation and performance of the test item after air drop capability subtest.

6.4.7 Leak Testing

- a. The results of leak testing shall be presented as prescribed in MTP 8-2-512.
- b. Narrative comments, photos, etc., shall be included, as required.

6.4.8 Operational Reliability

a. Data derived from this subtest shall be presented in narrative form, supplemented by drawings, photographs, charts, tables, graphs, or any other suitable means of displaying information. Data evaluation shall specifically include but not be limited to the following:

- 1) Average head of liquid against which pump works, in inches.
- 2) Maximum and mean rates of operation by a suitably determined number of operators, in strokes or revolutions per minute.
- 3) Discharge rate of pump, in gallons per minute, at mean rate of operation.
- 4) Mean time required for one complete fill cycle for a specified field dispersal device.
- 5) Evaluation of the pump's ability to transfer a prescribed amount of chemical without leakage or spillage.
- 6) Evaluation of pump provisions for handling toxic vapor.

b. The report shall clearly conclude whether the test item meets the reliability criteria established in applicable specifications. Recommendations relative to further testing and methods to overcome malfunctions shall also be included.

6.4.9 Decontamination Aspects

The results of this subtest shall be presented as indicated in the applicable sections of MTP 8-2-510.

6.4.10 Maintenance Aspects

Data from this subtest shall be presented in narrative form. The report shall be supplemented by photos, drawings, or other devices or substantiate the conclusions and recommendations.

6.4.11 Human Factors

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a. Data from this subtest shall be presented in tabular, narrative, or other suitable form supplemented by photographs and graphic or art presentations, as required.

b. A summary of comments regarding shortcomings and recommended improvements shall be presented.

6.4.12 Agent/Hardware Compatibility

Data from this subtest shall be presented in narrative form and shall clearly indicate whether agents have an effect on the test item, its components, or vice versa. The report shall be supplemented by photographs, drawings, or other devices required to support the conclusions.

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